

IN THE CLAIMS:

Please amend the claims as indicated below:

1. (Currently Amended) A method for reducing a program, M, that preserves at least
5 one branching time property, f, comprising the steps of:
forming a product of said program, M and said branching time property, f,
expressed as an automaton, $\bar{f}-A$;
obtaining an abstract domain containing a set of abstract values to generalize
possible states of said program and abstract relations that relate said program states to said
10 abstract domain; and
computing an abstract program with a reduced number of states and an altered
version of said branching time property, f, using said product.
2. (Original) The method of claim 1, further comprising the step of performing an
15 automated program check.
3. (Original) The method of claim 2, wherein said automated program check is a
model checking step.
- 20 4. (Original) The method of claim 3, wherein said automated program check is
performed for an altered branching time property.
5. (Currently Amended) The method of claim 1, wherein said computing step further
comprises the step of defining a set of states, S' , in said abstract program as $S' = \bar{S} \times Q$, where
25 S is a set of states in said program, M, and Q is a set of states of the automaton, A

6. (Original) The method of claim 5, wherein OR states in said set of states, S' , are those states where $\delta(q, true)$ has the form $q_1 \vee q_2$ or $\langle a \rangle q_1$, and all other states are AND states, where q are individual states and δ is a transition relation between states.
- 5 7. (Original) The method of claim 5, wherein an abstract state (t, \hat{q}) is in a subset of initial states, I' , of the abstract program if there exists $s \in I$ for which $s \xi_{\hat{q}} t$, where s is an individual state, I is a subset of initial states, I , of the program, M , and $\xi_{\hat{q}}$ is one of said abstract relations.
- 10 8. (Original) The method of claim 5, wherein for an abstract AND state (t, q) , the transition $((t, q); (t', q'))$ is in an abstract transition relation, R' , if there exists a concrete state (s, q) and a successor (s', q') that are related to $(t, q); (t', q')$ respectively.
9. (Original) The method of claim 5, wherein for an abstract OR state (t, q) , the
15 transition $((t, q); (t', q'))$ is in an abstract transition relation, R' , only if for every (s, q) which is related to (t, q) , there exists a successor (s', q') which is related to (t', q') .
10. (Original) The method of claim 8, wherein said product ATS $M \times A$ is abstracted
by weakening said transition relations at AND states.
- 20 11. (Original) The method of claim 9, wherein said product ATS $M \times A$ is abstracted
by strengthening said transition relations at OR states.
12. (Original) The method of claim 8, further comprising the step of obtaining one or
25 more rank functions and employing said one or more rank functions in an abstract transition
relation, R' .

13. (Original) The method of claim 8, further comprising the step of obtaining one or more choice predicates and employing said one or more rank functions in an abstract transition relation, R' .

5 14. (Currently Amended) A system for reducing a program, M , that preserves at least one branching time property, f , comprising:

a memory; and

a processor operatively coupled to said memory, said processor configured to:

form a product of said program, M and said branching time property, f , expressed

10 as an automaton, A ;

obtain an abstract domain containing a set of abstract values to generalize possible states of said program and abstract relations that relate said program states to said abstract domain; and

15 compute an abstract program with a reduced number of states and an altered version of said branching time property, f , using said product.

15. (Original) The system of claim 14, wherein said processor is further configured to perform an automated program check.

20 16. (Original) The system of claim 15, wherein said automated program check is a model checking step.

17. (Original) The system of claim 16, wherein said automated program check is performed for an altered branching time property.

25 18. (Currently Amended) The system of claim 14, wherein said processor is further configured to define a set of states, S' , in said abstract program as $S' = \bar{S} \times Q$, where S is a set of states in said program, M , and Q is a set of states of the automaton, A .

19. (Original) The system of claim 18, wherein OR states in said set of states, S' , are those states where $\delta(q, true)$ has the form $q_1 \vee q_2$ or $\langle a \rangle q_1$, and all other states are AND states, where q are individual states and δ is a transition relation between states.

5 20. (Original) The system of claim 18, wherein an abstract state (t, \hat{q}) is in a subset of initial states, I' , of the abstract program if there exists $s \in I$ for which $s \xi_{\hat{q}} t$, where s is an individual state, I is a subset of initial states, I , of the program, M , and $\xi_{\hat{q}}$ is one of said abstract relations.

10 21. (Original) The system of claim 18, wherein for an abstract AND state (t, q) , the transition $((t, q); (t', q'))$ is in an abstract transition relation, R' , if there exists a concrete state (s, q) and a successor (s', q') that are related to $(t, q); (t', q')$ respectively.

15 22. (Original) The system of claim 18, wherein for an abstract OR state (t, q) , the transition $((t, q); (t', q'))$ is in an abstract transition relation, R' , only if for every (s, q) which is related to (t, q) , there exists a successor (s', q') which is related to (t', q') .

20 23. (Original) The system of claim 21, wherein said product $ATS M \times A$ is abstracted by weakening said transition relations at AND states.

24. (Original) The system of claim 22, wherein said product $ATS M \times A$ is abstracted by strengthening said transition relations at OR states.

25 25. (Original) The system of claim 21, further comprising the step of obtaining one or more rank functions and employing said one or more rank functions in an abstract transition relation, R' .

26 (Original) The system of claim 21, further comprising the step of obtaining one or more choice predicates and employing said one or more rank functions in an abstract transition relation, R' .